Name:_____

Test Your Skills - 08
Deadline - 4/28

Answer these exercises, in complete mathematical sentences and using mathematical notation properly. You are to work on these individually, without collaboration. You may consult your book and myself, but **not the math lab** or other resources. To earn extra credit, stop into my office hours (or make an appointment) and present your solutions. Partial credit will be given for any earnest attempt.

Exercise 1. *Prove the following:*

a) If $f : \mathbb{R}^2 \to \mathbb{R}$ *is a constant function (i.e.* $f(x, y) = k$ *for some constant* k*) and* $R = [a, b] \times [c, d]$*, then* $\iint_R f(x, y)dA = k(b - a)(d - c)$*.*

b) If $R = [0, \frac{1}{4}] \times [\frac{1}{4}, \frac{1}{2}]$*, then*

$$0 \leq \iint_R \sin(\pi x) \cos(\pi y)\, dA \leq \frac{1}{32}.$$

Exercise 2. *Show that, if* $f(x, y)$ *is continuous on* $[a, b] \times [c, d]$*, and we define*

$$g(x, y) = \int_a^x \int_c^y f(s, t)\, dt\, ds$$

for $a < x < b$ *and* $c < y < d$*, then* $g_{xy} = g_{yx} = f(x, y)$*.*

Exercise 3. *Complete Exercise 16.3 #57.*

Exercise 4. *Complete Exercise 16.4 #36.*